# *Climate Change Adaptation Approaches*

Presented at the
**E2S2 Symposium**
***May 11th, 2011***
***New Orleans, LA***


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US Army Corps of Engineers
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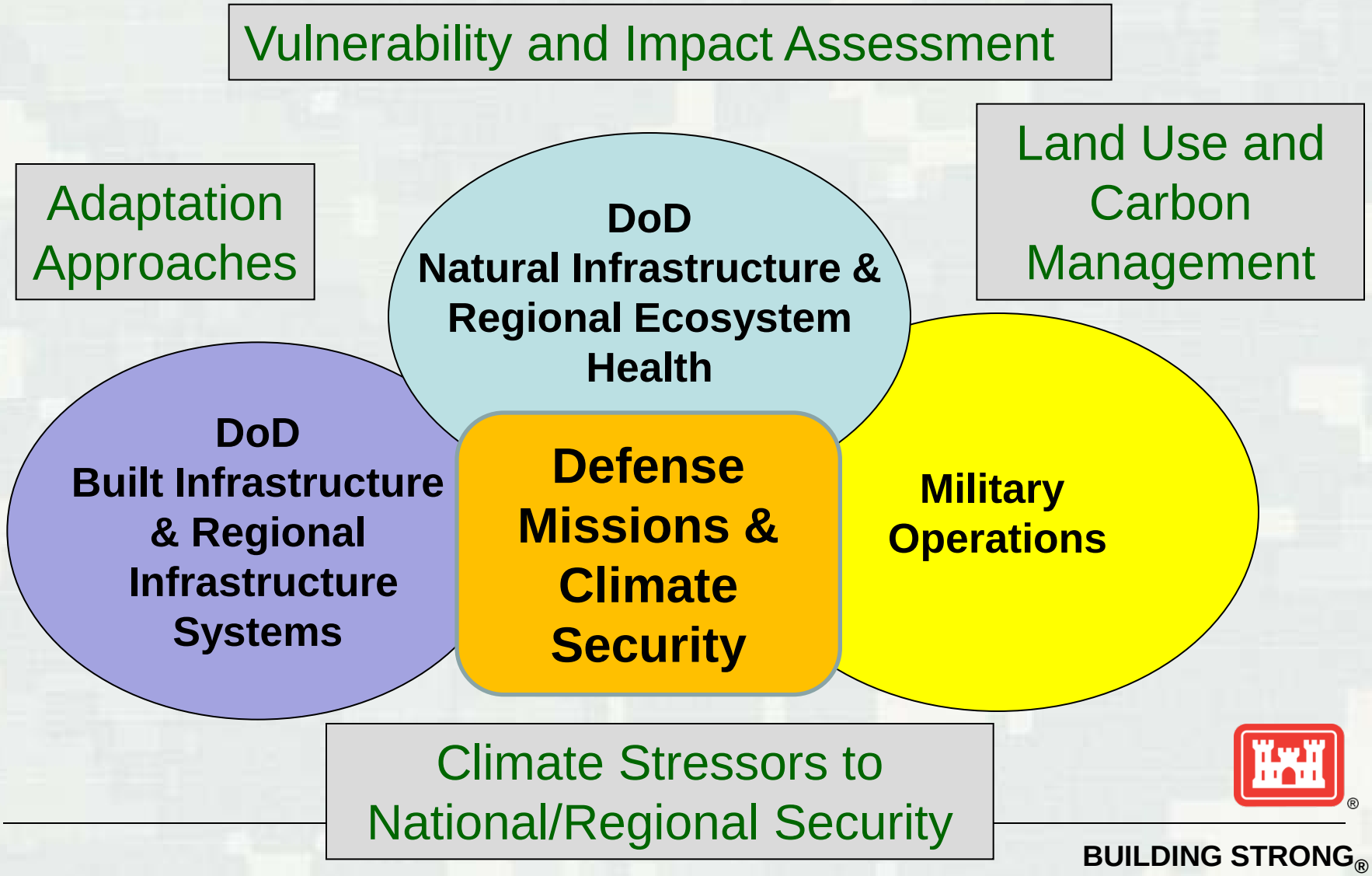
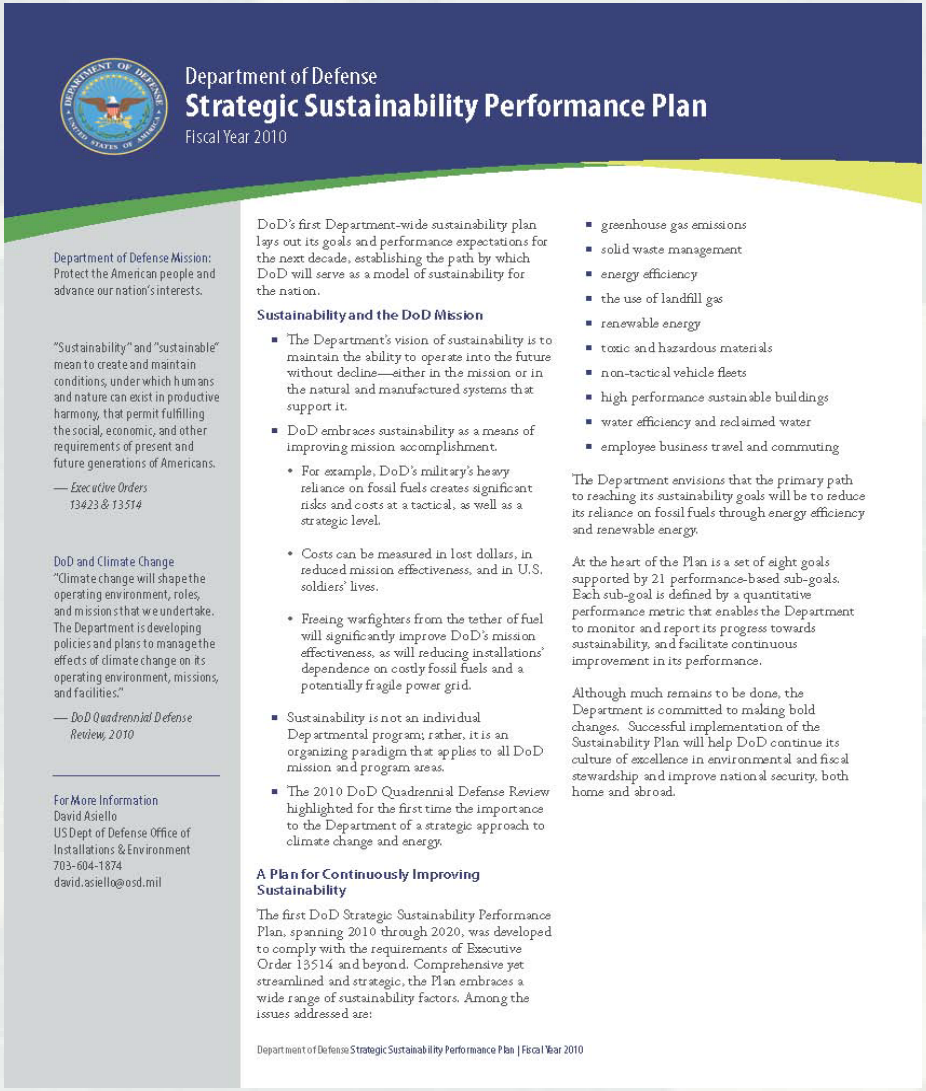
# Climate Concerns for Department of Defense



# Department of Defense
# Strategic Sustainability Performance Plan (8/26/10)

- Mandated by EO 13514 (10/09).
- ***One of the four priorities is to maintain readiness in the face of climate change.***
- Addressing Climate Change Risk and Vulnerability: a Three-Phase Approach
  - **Phase 1:** Development of a decision framework
    - *coordinate with other federal entities*
  - **Phase 2**: Climate change impact assessments
    - *develop analytical methodology and tool guidance for conducting assessments*
  - **Phase 3**: Climate change adaptation planning
    - *robust strategies*



Department of Defense
**Strategic Sustainability Performance Plan**
Fiscal Year 2010

Department of Defense Mission:
Protect the American people and advance our nation's interests.

"Sustainability" and "sustainable" mean to create and maintain conditions, under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations of Americans.

— *Executive Orders 13423 & 13514*

DoD and Climate Change
"Climate change will shape the operating environment, roles, and missions that we undertake. The Department is developing policies and plans to manage the effects of climate change on its operating environment, missions, and facilities."

— *DoD Quadrennial Defense Review, 2010*

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DoD's first Department-wide sustainability plan lays out its goals and performance expectations for the next decade, establishing the path by which DoD will serve as a model of sustainability for the nation.

**Sustainability and the DoD Mission**

- The Department's vision of sustainability is to maintain the ability to operate into the future without decline—either in the mission or in the natural and manufactured systems that support it.
- DoD embraces sustainability as a means of improving mission accomplishment.
  - For example, DoD's military's heavy reliance on fossil fuels creates significant risks and costs at a tactical, as well as a strategic level.
  - Costs can be measured in lost dollars, in reduced mission effectiveness, and in U.S. soldiers' lives.
  - Freeing warfighters from the tether of fuel will significantly improve DoD's mission effectiveness, as will reducing installations' dependence on costly fossil fuels and a potentially fragile power grid.
- Sustainability is not an individual Departmental program; rather, it is an organizing paradigm that applies to all DoD mission and program areas.
- The 2010 DoD Quadrennial Defense Review highlighted for the first time the importance to the Department of a strategic approach to climate change and energy.

**A Plan for Continuously Improving Sustainability**

The first DoD Strategic Sustainability Performance Plan, spanning 2010 through 2020, was developed to comply with the requirements of Executive Order 13514 and beyond. Comprehensive yet streamlined and strategic, the Plan embraces a wide range of sustainability factors. Among the issues addressed are:

- greenhouse gas emissions
- solid waste management
- energy efficiency
- the use of landfill gas
- renewable energy
- toxic and hazardous materials
- non-tactical vehicle fleets
- high performance sustainable buildings
- water efficiency and reclaimed water
- employee business travel and commuting

The Department envisions that the primary path to reaching its sustainability goals will be to reduce its reliance on fossil fuels through energy efficiency and renewable energy.

At the heart of the Plan is a set of eight goals supported by 21 performance-based sub-goals. Each sub-goal is defined by a quantitative performance metric that enables the Department to monitor and report its progress towards sustainability, and facilitate continuous improvement in its performance.

Although much remains to be done, the Department is committed to making bold changes. Successful implementation of the Sustainability Plan will help DoD continue its culture of excellence in environmental and fiscal stewardship and improve national security, both home and abroad.

Department of Defense Strategic Sustainability Performance Plan | Fiscal Year 2010

New CEQ Implementing Instructions – 4 March 2011

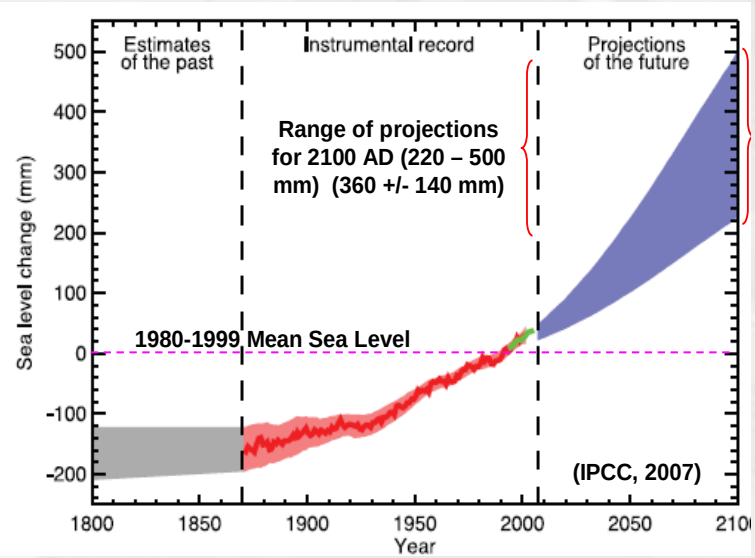
# Council on Environmental Quality (CEQ) Guidance

## Requirements

- Identify senior agency person responsible for adaptation by 3 Jun 2011
- Conduct high level agency assessment & identify priority actions for 2012 by 30 Sep 2011
- Conduct more detailed agency assessment by March 2012
- Integrate into 2012 Strategic Sustainability Performance Plan (SSPP) by 4 June 2012

New CEQ Implementing Instructions – 4 March 2011

# Approaching Climate Change Impact Assessment




Traditional approach is to use IPCC general circulation models projections and scenarios (such as for sea level change, above) to determine extent of potential change and uncertainty of this change, and then identify what might be impacted.

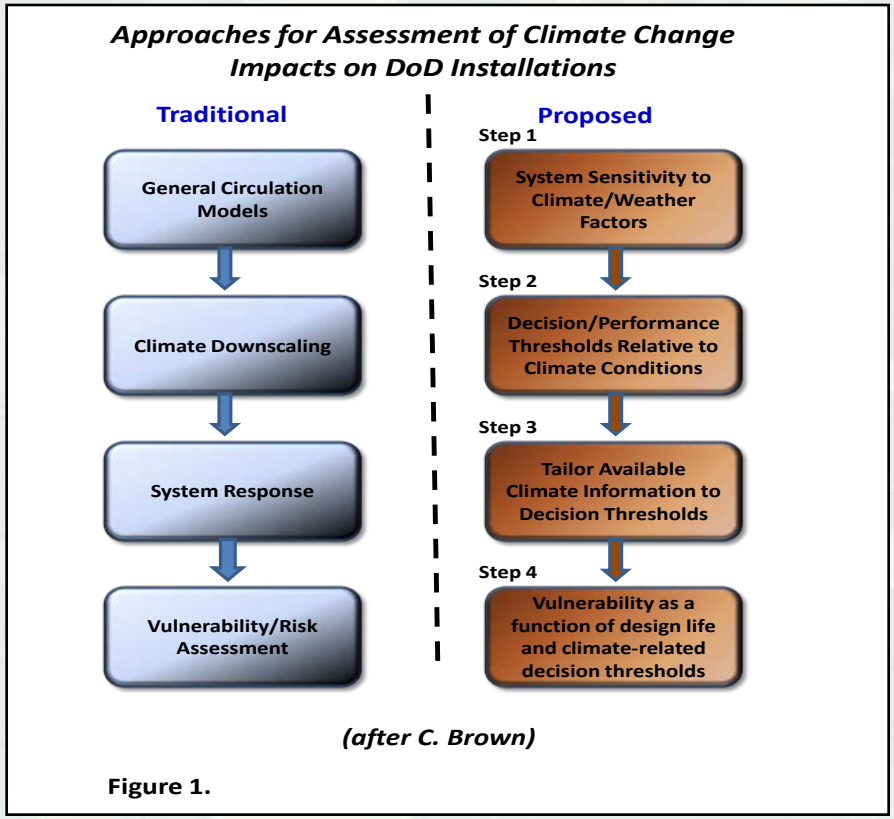



Figure 1.

Alternative is to understand system sensitivities to changing parameters, and then apply best available climate information to relevant decisions about these systems

# Framework for Climate Change Vulnerability Assessment and Adaptation Planning

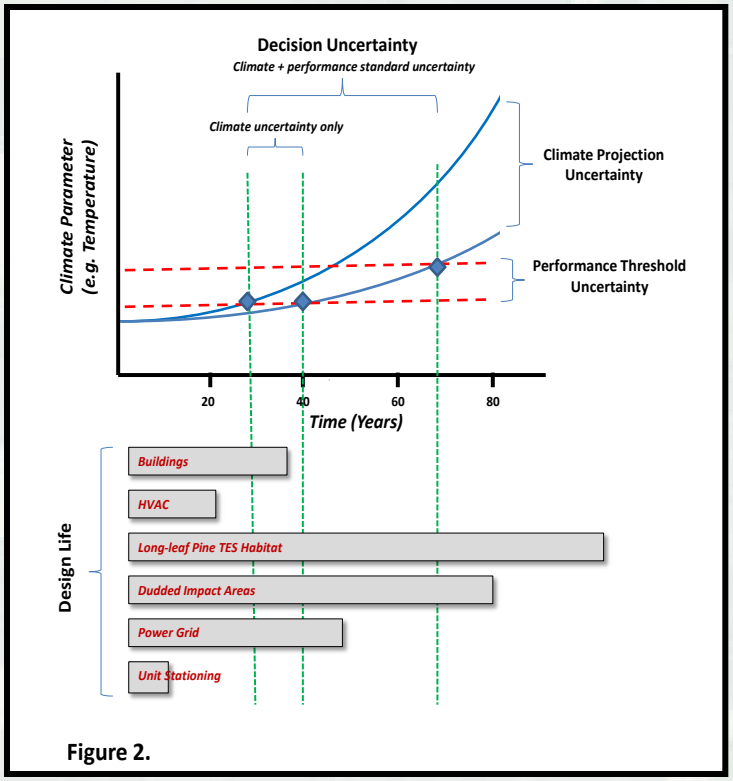



Figure 2.

**Proposal Goals:** Determine potential impacts of climate change to Army operations, built infrastructure and natural environment and express these impacts in an assessment framework

The basis for this framework is a process of "**decision-scaling**," which directly maps Army relevant decision processes, operational sustainability, and decision time scales to required climate information. The framework will be applied to a few selected key impacts (e.g., sea level rise, rainfall intensity, drought, temperature change) and affected decision processes in each of the key focus areas: operations, infrastructure and facilities, and natural resources.

**2.0 Provide Facilities, Programs & Services to Support the Army and Army Families**
ASA (IE&E)
Staff Coordination: ACSIM
In Support: SICE

Army Campaign Plan

2-7 Adapt / Execute Climate Strategies
ASA (IE&E)

Proposed IEE Project

# Assessment of Impacts

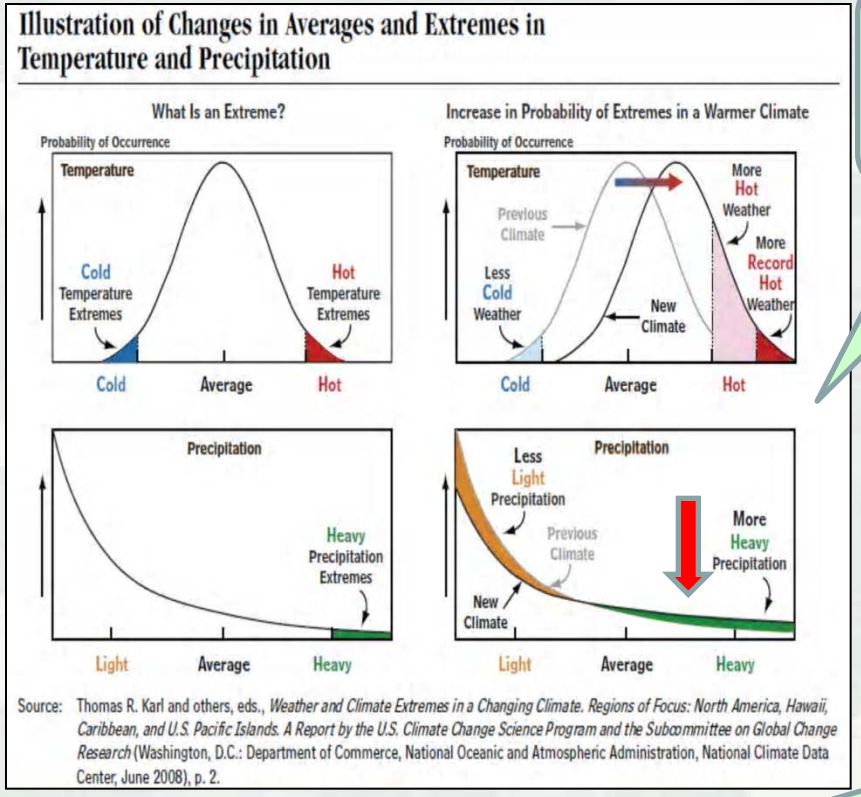
At the enterprise level

- Missions: how will missions be impacted by the impacts of climate change, and how will conditions change in potential (actual) theatre locations?
- Stationing:  what mission activities might be compromised at which locations, and how will this impact overall readiness?
- Training: will conditions inhibit training or will perhaps help simulate circumstances in potential theatre contexts?
- Grid uncertainty/reliability: what locations might be impacted – and what adaptation are required to sustain reliable power, and what missions might be compromised with widespread power loss?

At the installation level

- Habitat restoration: longer term habitat restoration projects have long time exposures, and feasibility may be questionable
- Construction projects: increase in cooling degree days, changes in moisture regimes
- Safety for soldiers: exposure to high heat, high humidity may limit in field training in summer season

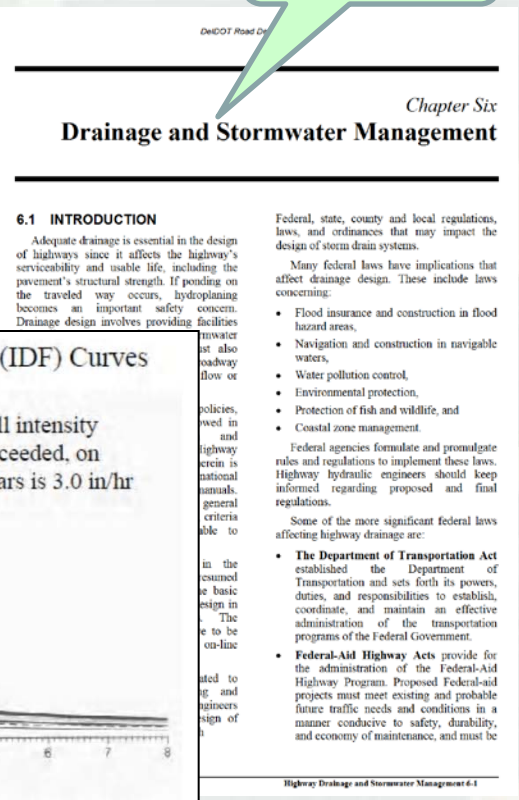
# Relating Sensitivity in Design Parameters to Climate Impacts




Source: Thomas R. Karl and others, eds., *Weather and Climate Extremes in a Changing Climate. Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research* (Washington, D.C.: Department of Commerce, National Oceanic and Atmospheric Administration, National Climate Data Center, June 2008), p. 2.

***Climate Change Impacts to Weather Patterns***

***"Design Manual"***



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*Chapter Six*

**Drainage and Stormwater Management**

**6.1 INTRODUCTION**

Adequate drainage is essential in the design of highways since it affects the highway's serviceability and usable life, including the pavement's structural strength. If ponding on the traveled way occurs, hydroplaning becomes an important safety concern. Drainage design involves providing facilities

Federal, state, county and local regulations, laws, and ordinances that may impact the design of storm drain systems.

Many federal laws have implications that affect drainage design. These include laws concerning:

- Flood insurance and construction in flood hazard areas,
- Navigation and construction in navigable waters,
- Water pollution control,
- Environmental protection,
- Protection of fish and wildlife, and
- Coastal zone management.

Federal agencies formulate and promulgate rules and regulations to implement these laws. Highway hydraulic engineers should keep informed regarding proposed and final regulations.

Some of the more significant federal laws affecting highway drainage are:

- **The Department of Transportation Act** established the Department of Transportation and sets forth its powers, duties, and responsibilities to establish, coordinate, and maintain an effective administration of the transportation programs of the Federal Government.
- **Federal-Aid Highway Acts** provide for the administration of the Federal-Aid Highway Program. Proposed Federal-aid projects must meet existing and probable future traffic needs and conditions in a manner conducive to safety, durability, and economy of maintenance, and must be

Highway Drainage and Stormwater Management 6-1

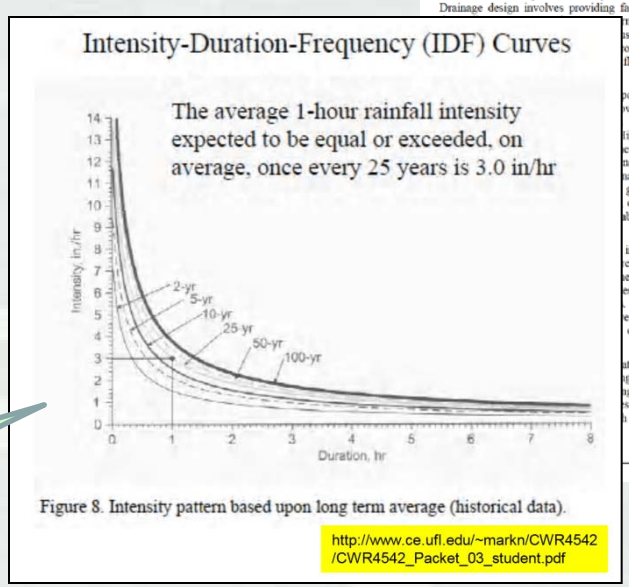



Figure 8. Intensity pattern based upon long term average (historical data).

http://www.ce.ufl.edu/~markn/CWR4542/CWR4542_Packet_03_student.pdf

***"Historical Data"***

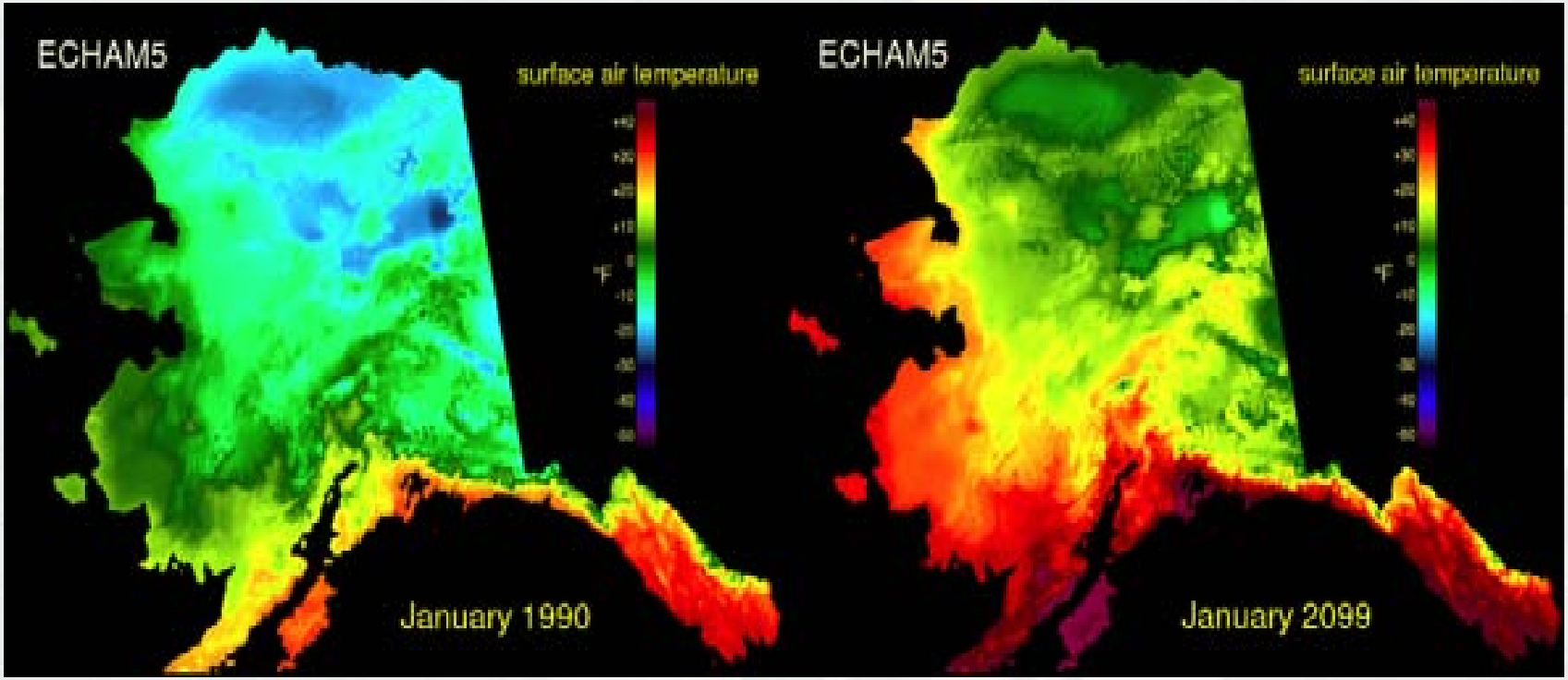
# Some Adaptation Considerations

- Budgets are limited today, and will be limited tomorrow – we need good methods that help us understand choices along the time/cost spectrum of changing climatic conditions.
- We are making numerous decisions today about built/natural infrastructure and military operations that are already impacted, or will be impacted, directly or indirectly, by changing climatic conditions. These decisions could become more and more expensive if we delay integrating considerations of these impacts.
- In some cases, the second or third order impacts are the most alarming in terms of costs and disruption for Defense operations, security stressors, and built and/or natural environments.
- A “framework” in needed to align climate impacts and stressors to the “sensitivity” of management, operational and mission decisions to changing climatic conditions – to help focus limited resources
- This framework should inform existing planning and budgeting processes – not generate another process

# Moving Forward

- Develop Framework
- Assess Impacts and Sensitivities
- Integrate into Strategies, Plans and Budgets
- Adapt and Adjust
- Built linkages across plans

# Questions?




US Global Change Research Program
www.usgcrp.gov

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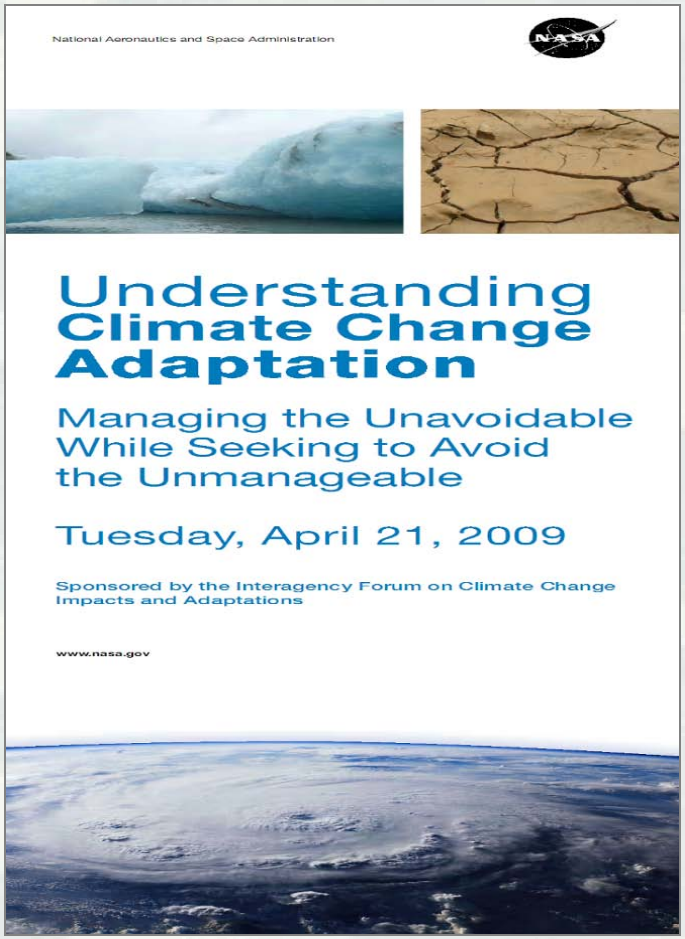
# Climate Change Forum

- Inter-Agency Climate Change Impacts and Adaptation Forum
  - Meets in DC area 6-8 times/year (phone in participants from across US)
  - Co-chaired by NASA (S. Higuchi) & USACE (W. Goran)
  - Now in 4th year, all presentations on FedCenter
  - Over 30 agencies involved, including many Defense participants.
  - 2011 Forum last sessions: May 4th, next Aug 2nd
    - Blair Feltman, University of Waterloo, Adaptation Approaches in Canada
    - Kevin Knuuti, Sea Level Rise
    - Joe Thompson, GAO, Cost of Climate Change Adaptation
  - Selected 2010 speakers:
    - CAPT Tim Gallaudet – U.S. Navy's Task Force CC
    - Chris Pyke - U.S. Green Building Council, Designing for a Changing Climate
    - Kathy Jacobs, Director, National Climate Assessment
    - Maria Blair, CEQ Climate Change Adaptation Coordinator




**Contact: ccforum@fedcenter.gov**